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POCONO MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

## **An Inexpensive Truck-Mounted Ladder for Inspecting Conelet Development and Collecting Cones**

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The versatile rig is stable, durable, quickly moved from tree to tree, and easily removed from the truck. Four camper jacks eliminate sway due to the vehicle's suspension. Although designed specifically for making nondestructive inspections of flower and conelet development and cone collection, the platform without ladder is also useful.

**Keywords:** Truck-mounted ladder, cone collection equipment.

Many devices have been adapted or designed to facilitate various aspects of cone production and collection (Stein et al. 1974). They range from picking platforms or scaffolds mounted on trucks or trailers to tree shakers for collection of cones in quantity (Grinnel and Herridge 1970, Kmeczka 1970, Petersen 1962). They also include sectional and rope ladders, climbing steps, and climbing irons for reaching a few valuable cones at the tops of certain trees (Denison et al. 1972, Morandini 1961). A vertical lift with a cantilever-type boom is useful for collecting cones from the periphery of the crown, but has the disadvantages of high cost and restricted use

of the vehicle (USDA Forest Service 1968). One thing most of these methods have in common is the relatively high cost of collecting quality seed from specific trees.

We need crown-access apparatus in experimental work for such purposes as nondestructive inspection of conelet development, and for collecting cones from a relatively small number of trees at regular intervals. The apparatus should be safe, functional, inexpensive, highly mobile, have other uses, and be readily removable from the vehicle. The truck-mounted ladder described here was designed to meet these requirements. It is similar in some respects to those described by Johansen and Arline (1958) and Funsch (1971), and is similarly based on a ½-ton four-wheel-drive truck.

Rather than a tall, stationary support framework, the 36-foot magnesium extension ladder is supported

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by a platform rack and a pair of support struts mounted near the front of the platform (fig. 1). The support struts were made of 2-inch standard galvanized pipe with  $\frac{1}{4}$ -inch steel plate welded to the ends at appropriate angles to connect to the ladder and platform. The base of the ladder and the support struts are attached to brackets mounted on the tailgate and platform, respectively, and are locked into position by steel pins with cotter keys (fig. 2). The support struts and stationary pivot mount on the platform are connected to the ladder by steel rods passed through steel sleeves fitted to the



Figure 1.—The truck-mounted extension ladder set up beside a 32-foot ponderosa pine. The design utilizes a platform rack and two heavy vertical struts for support. Four camper jacks serve as outriggers to eliminate sway due to the vehicle's suspension, and facilitate removal of the rig from the truck.



Figure 2.—The base of the extension ladder is attached to brackets on the truck tailgate by steel pins. Note reinforcement of ladder above the point of attachment and wide steps on the ladder.

hollow ladder rungs (fig. 3). The ends of the steel rods are threaded and drilled to accept nuts and safety pins. Thus, all stationary and movable connections are steel against steel to reduce wear and prevent loosening. Sway is minimized by fitting all connections to close tolerances and using  $\frac{1}{4}$ -inch-thick steel plate reinforcement at the base and pivot mountings (fig. 2 and 3).

Sway due to the vehicle's suspension is virtually eliminated by four 3,000-lb-capacity mechanical camper trailer jacks attached to the support posts of the platform rack. The jacks are spaced 1 inch away from the truck body and fitted with enlarged bases (8 inches by 8 inches) for added support. The jacks also level the rig on uneven ground, and are used to remove the rig from the truck.



When traveling, the ladder and support struts rest on the 7-foot-high platform (fig. 4). The rear overhang of 4 feet is legal, but should be flagged for added safety. The stabilizing jacks are locked in the raised position to insure adequate clearance when the truck is moved.

Raising the ladder is essentially a two-man operation. One man on the platform lifts the top of the ladder while the second pulls down on the base and inserts the steel pins and cotter keys that connect the base of the ladder to the mountings on the tailgate. The ladder pivots on the stationary mounting at the rear of the platform. With the base of the ladder secure, the support struts are swung along the outside of the platform and connected to their

mountings, also by steel pins and cotter keys. When the stabilizing jacks are unlocked, their bases drop to the ground. Then one or two strokes on each jack, using a detachable handle, is sufficient to stabilize the truck. The ladder may then be extended to the desired height. About 10 minutes are required to initially set up the rig. With the extension down, stabilizing jacks up, and one person acting as a spotter, the truck can be driven from tree to tree with the ladder upright. For maximum safety, the extension ladder should not be raised more than half its length—approximately 30 feet, including the height of the tailgate. A ladder-type safety belt and hard hat should be worn when working on the ladder.

Figure 3.—Detail of stationary pivot mount on the platform. The reinforced ladder is attached by a steel rod passed through a steel sleeve fitted to the hollow ladder rung.



Figure 4.—When disassembled, the extension ladder and support struts pivot down and rest on the platform; the stabilizing jacks are raised and locked to maintain vehicle clearance. Rear overhang is 4 feet.



The platform and ladder rig are easily removed from the truck with the stabilizing jacks. The bolts and backing plates holding the platform to the truck bed are removed. Then the ladder rig is lifted with the jacks until it clears the truck bed. The truck can then be driven away, to be used for other purposes.

The platform by itself was found to be useful for collecting cones with a long aluminum pole tipped with a sharpened hook. The platform surface was coated with fine silica sand for safety. Additionally, the ladder or platform provides a good vantage point for photography.

Material and construction costs for the ladder rig amount to \$1,137 (1974 prices). This figure includes \$464 in materials and labor for mounting the platform, construction of the support struts and other mountings for the ladder, and attachment of the stabilizing jacks, all by a competent welder. The heavy duty magnesium extension ladder cost \$356.

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